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BLOWING OFF SOME ~~STEAM~~ AMMONIA

- REVISITED

By Bill Lape, SCS Engineers

It never seems to end. Every time one of our engineers goes to a facility to perform an audit, PHA, or MI inspection, we find SRVs installed in a manner in which all we can do is shake our head.

Maybe the installing contractor ran out of pipe in the picture above, or maybe the prevailing winds at this facility are from left to right in the photo. At any rate, this PRV installation does not comply with IIAR2-2021, Sections 15.5.1.2 and 15.5.1.5, which state:

15.5.1.2: The termination of discharge piping relieving to atmosphere shall be not less than 15 ft (4.6 m) above grade and not less than 20 ft (6.1 m) from windows, doors, and ventilation intakes. These PRVs are less than 15 ft above grade.

*15.5.1.5: *The termination of the discharge shall be directed upward and arranged to avoid spraying ammonia on persons in the vicinity.* Since the PRVs are not connected to the relief piping, they are not discharged upwards when they lift.

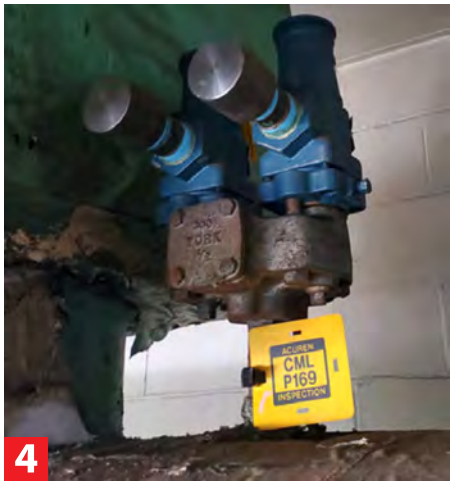
The PRVS in picture 2, while directed upwards, do not fully comply with Section 15.5.1.2, as they are inside a machinery room and will most certainly spray ammonia on persons in the vicinity.

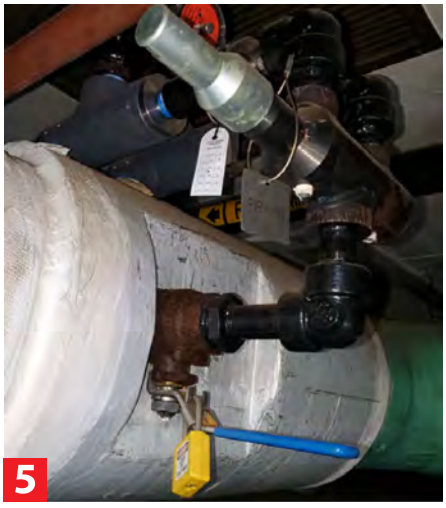
Because the PRVS in Picture 2 do not discharge outdoors, they also run afoul of Section 15.5.1, which states in part:

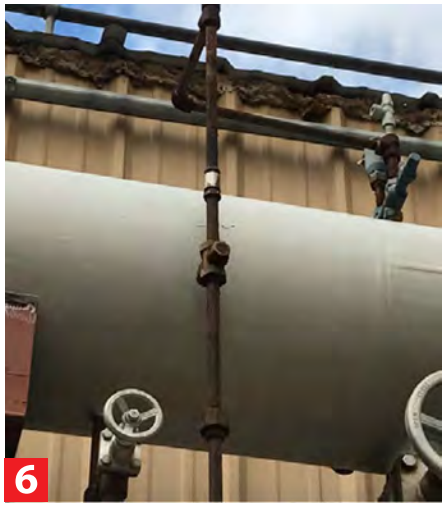
15.5.1: Atmospheric Discharge. Pressure relief devices shall discharge vapor directly to the atmosphere outdoors in accordance with this section. Need I say more?

As do the PRVs in Picture 3, which were installed on a screw compressor in the same machinery room.

At first glance, virtually any ammonia refrigeration operator or safety professional







would take great issue with the PRVs in

Picture 4 that are actually plugged with carbon steel caps threaded onto the pipe nipples that are screwed into their outlet ports. This particular vessel was actually protected by a different set of PRVs attached to the suction outlet of the vessel, as shown in Picture 5.

Now, the PRVs in Picture 5 do not comply with IIAR2 because they violate Section 15.4.1, which states in part:

15.4.1: "'Stop valves shall not be installed in the inlet piping of pressure relief devices. There is a stop valve on the inlet to the PRVs in Picture 5. While the ASME Boiler & Pressure Vessel Code allows for stop valves to be installed on the inlets to ASME certified relief valves, as long as they are administratively managed in accordance with the provisions of Appendix B-7, IIAR2 does not. In fact, this particular instance may not comply with the ASME appendix if not administrative controls are in place to manage the removal of the locking devices and to ensure that an overpressure situation cannot result while the equipment is isolated from the PRVs.

For Picture 6, the reality is that if the three-way valve is positioned such that this cobbled up level indicator is functional, then it will violate Section 15.3.1 of IIAR2.

Section 15.3.1.1 states:

15.3.1.1: Pressure vessels and equipment built and stamped in accordance with ASME B&PVC, Section VIII, Division I (2017), shall be provided with pressure relief protection in accordance with ASME B&PVC, Section VIII. Division 1.

If, in fact, this vessel is not ASME stamped, then it violates Section U-1 of Section VIII, Division 1, of the Boiler & Pressure Vessel Code. This section of the B&PVV does not apply to vessels that have an inside diameter, height, width, or cross-sectional diagonal that do not exceed 6 inches, which this vessel clearly does.

The last set of pictures are my favorite, and since the facility has been closed, I don't mind sharing them. In Picture 7, we see some PRVs tied into what looks like a discharge pipe. The pipes entering the vertical discharge header appear to be branches from other relief valves.

When, in fact, those pipes are actually the rungs of a ladder, as you can see in picture 8.

Picture 9 gives a view of the full discharge header.

How many sections of IIAR2 does this installation violate? Well, let's count them.

15.4.5: Discharge piping shall be supported in accordance with Section 13.4

*13.4.1 * Piping hangers and supports shall carry the weight of the piping and any additional expected loads.* Did they account for the weight of the operator climbing the ladder to get to the catwalk?

*13.4.2 *Refrigerant piping shall be isolated and supported to prevent damage from vibration, stress, corrosion, and physical impact.* Hard to isolate the piping when it is integral to something else.

15.5.1.3 The discharge termination from piping relieving to atmosphere shall not be less than 7.25 ft (2.2 m) above a roof. Where a higher adjacent roof level is within 20 ft (6.1 m) horizontal distance from the relief discharge, the discharge termination shall not be less than 7 .25 ft (2.2 m) above the height of the higher adjacent roof. It is hard to tell from the photo, but the discharge is less than 7.25 ft above the roof on which the photographer stands, which is less than 20 ft horizontal distance from the discharge.

*15.5.1.5: *The termination of the discharge shall be directed upward and arranged to avoid spraying ammonia on persons in the vicinity.* The discharge is horizontal.

15.5.l.6: Piping discharging to atmosphere shall have a provision for draining moisture from the piping. None is visible.

PRVs and their associated piping are intended to help keep us safe in the event of an overpressure situation. The risks of them failing to do their job rise dramatically when the codes and standards governing their design and installation are not followed.

If you have pictures of some Epic Fails from your "Brother-in-law's" facility, please send them to NH3isB2L@gmail.com.

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